

BASF Corporation

BASF

CERTIFIED MAIL - RETURN RECEIPT REQUESTED
P 607 933 861

September 15, 1998

Ms. Diane Sharrow
Project Manager
United States Environmental Protection Agency
Region V, (DRE-9J)
77 West Jackson Street
Chicago, Illinois 60604

Subject: Draft Response to EPA's Data Validation Comments
BASF Corporation, Wyandotte, Michigan
U.S. EPA Identification Number MID 064 197 742
Draft RCRA Facility Investigation Report

US EPA RECORDS CENTER REGION 5



1004372

Dear Ms. Sharrow:

BASF Corporation is submitting a draft response to EPA's data validation comments as listed in SECTION 1 of your letter dated May 11, 1998. All of the responses except for General Comment # 3 are from Environmental Standards Incorporated (ESI) and an ESI letter dated September 11, 1998, is attached. BASF and QST developed a decision tree for determining whether the original analysis or the re-analysis would be used when both were reported. For your convenience a copy of the decision tree is attached. Also attached is a spreadsheet showing which analyses were used. Please note that ESI is requesting some feed-back from EPA.

After there is agreement between EPA and BASF on the data validation issues, BASF will submit a revised RFI report. We believe it is better to respond to EPA's final comments in two stages because changes to the qualifiers will change the tables and perhaps some wording in the RFI report.

Sincerely yours,

Bruce Roberts
Project Manager

Attachments

cc: E. Nuernberg -- BASF
N. Martin -- BASF
D. Marian -- QST
R. Vitale -- ESI

1609 Biddle Avenue, Wyandotte, Michigan 48192 (734) 324-6100

March 13, 1998

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5, DRE-9P
77 West Jackson Boulevard
Chicago, IL 60604

Reference: EPA Contract No. 68-W4-0006; Work Assignment No. R05020; Corrective Action Oversight and Split Sampling; BASF Corporation; Wyandotte, MI; BASF RFI Report Hydrogeological Data Evaluation; Deliverable Task 09

Dear Mr. Freeman:

Please find enclosed TechLaw's review of the Geological and Hydrogeological information provided in the BASF Corporation's (BASF's) RCRA Facility Investigation (RFI) Report for the above referenced facility. Also enclosed is a 3.5-inch diskette with this deliverable, formatted in WordPerfect 6.1 for Windows, for your use.

This deliverable has been prepared in response to your December 9, 1997 Technical Directive Memorandum (TDM) which requested a review of the hydrogeological characterization presented in the RFI Report, as well as an evaluation of the Data Validation Reports for the RFI and a data comparison. The review of the Data Validation Reports and the data comparison were previously submitted under separate cover.

As discussed with Ms. Diane Sharrow, the Region 5 Technical Contact for this TDM, additional information was required to complete a full assessment of the hydrogeological characterization. A request for this additional information was made to the facility and their contractor, QST. However, while this information was originally requested over three weeks ago, it was not received from BASF until March 4, 1997. Hence, this deliverable was delayed to ensure that the additional information was evaluated prior to completion of the deliverable

Based upon our review of the additional information, we have adjusted our initial comments as appropriate. However, one of the requests for additional information focused on the results from a pump test performed at the facility during the RFI. The RFI Report did not provide sufficient detail to fully evaluate the conclusions drawn as a result of the pump test. Therefore, we

Mr. Brian Freeman
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Page 2 of 2

requested additional information, including data gathered at the observation wells monitored as a part of the pump test. While we received data from the piezometers evaluated, the data was incomplete. The exact location of the piezometers was not indicated and the associated water level data was provided in the form of raw data from the transducers/data loggers used during the evaluation. This transducer data relates to the actual water levels in the piezometers but can not be directly related without first undergoing a conversion. Hence, to avoid necessary delays in submitting this deliverable to you we did not perform this conversion. However, should U.S. EPA wish us to evaluate these data, we can do so at your request. It is anticipated that hand conversion of this data, even for only a limited number of data entries, may take up to a day to complete. Please feel free to contact us at your convenience regarding this additional evaluation.

Please feel free to contact me at (312)345-8963 or Mr. John Koehnen at (312)345-8938 if you have any questions.

Sincerely,

Patricia Brown-Derocher
Regional Manager

cc: F. Norling, U.S. EPA Region 5 (w/out attachment)
D. Sharrow, U.S. EPA Region 5
B. Jordan
C. Moeller
J. Koehnen

**BASE CORPORATION.
US EPA ID No. MID064197742
RFI REPORT - HYDROGEOLOGICAL ASSESSMENT**

TASK 09 DELIVERABLE

Submitted to:

**Mr. Brian Freeman
U.S. EPA Environmental Protection Agency
Region 5 - DRE-9J
77 West Jackson Boulevard
Chicago, Illinois 60604**

Submitted By:

**TechLaw, Inc.
20 North Wacker Drive, Suite 1260
Chicago, Illinois 60606**

EPA Work Assignment No. :	R05020
Contract Number:	68-W4-0006
TechLaw WAM:	Patricia Brown-Derocher
TechLaw WAM Telephone No.:	(312) 345-8963
EPA WAM:	Brian Freeman
EPA WAM Telephone No.:	(312) 353-2720

March 13, 1998

BASF CORPORATION.
US EPA ID No. MID064197742
RFI REPORT - HYDROGEOLOGICAL ASSESSMENT

GENERAL COMMENTS

1. Groundwater samples collected from monitoring wells RFIMW-5, RFIMW-6, RFIMW-7, and RFIMW-12 have historically had pH levels greater than 12. Based upon these results, the groundwater at these locations could be classified as hazardous, based on characteristics. However, BASF does not discuss the high pH groundwater and the fact that these monitoring wells are located adjacent to the river. At a minimum, these findings should be further evaluated and their significance discussed in the RFI Report. Also see Specific Comment 13 relating to this issue.
2. Some of the preliminary site-specific action levels (PSALs) for groundwater were derived from the mean concentrations of a constituent in groundwater samples collected from the background monitoring wells. Three of the seven background wells (RFIMW-28, RFIMW-29, and P34N) are located in the southwest portion of the site. BASF has indicated, and on some of the potentiometric maps it appears, that groundwater flow is toward these monitoring wells. Therefore, these three wells may not be background wells and should not have been included in determining a mean background value. BASF should further evaluate the suitability of the wells designated as background.
3. Of the seven background monitoring wells, only two (RFIMW-24 and RFIMW-27) indicated that photoionization detector (PID) or flame ionization detector (FID) readings were made on soil samples collected from the well borings during the well installation. RFIMW-24 had one reading at 4 feet and RFIMW-27 showed three readings at 1.0, 6.5, and 13 feet respectively. BASF indicated that all boring were sampled continuously and that each sample was tested for VOCs by headspace analysis. Since RFIMW-28 and RFIMW-29 may actually be downgradient wells, it would be helpful to have

PID/FID reading from all the samples collected at these borings. In addition, the quantification limits for the various semi-volatile and metal analysis run on soil samples from the well borings are significantly different than the quantification limits for the analysis run on the background samples for fill and sand (Tables 7-1 and 7-2). BASF should provide any additional data available for these wells and clarify the discrepancy regarding the quantification limits used.

4. BASF repeatedly discusses releases from the various SWMUs and AOCs in terms of hazardous waste. However, BASF does not indicate if there have ever been releases of hazardous constituents to the environment. If available, BASF should include, and discuss, any additional information concerning releases of hazardous constituents to the environment, not limiting the discussions and investigations to release of hazardous wastes to the environment.
5. BASF installed 29 monitoring wells (RFIMW-1 - RFIMW-29) during the investigation yet only collected groundwater level data from 21 of these wells. There was no explanation why groundwater levels for the other eight wells were not collected/reported. BASF should clarify why groundwater level data was not collected from these additional wells
6. On many of the potentiometric maps located in the report, information overlaps other information making both illegible. Revise applicable figures and maps to eliminate overlap.

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US EPA ID No. MID064197742
RFI REPORT - HYDROGEOLOGICAL ASSESSMENT

SPECIFIC COMMENTS

Section 3.1.1, Site Geology, pgs. 3-1 and 3-2.

1. BASF indicates that the bedrock (dolomite) occurs at the site at about 70 feet below land surface (bls); however, the Phase 1 RCRA Facility Investigation Report (RFI) does not document any borings that penetrate the clay and bore into the bedrock. BASF refers to prior literature evaluations and subsurface investigations but does not specifically identify these sources. BASF should provide additional information on the prior investigations used to determine the site conditions and should either provide this information in the RFI Report and/or provide detailed references to the location(s) of the information

Section 3.1.3, Site Hydrogeology, pg. 3-3.

2. BASF correctly describes the groundwater flow conditions at the site as complex. BASF has not however, presented detailed information in the RFI Report to fully describe a complex groundwater flow regime. BASF has limited groundwater discussions to only the "Native Sand" unit. There is no discussion on groundwater present in the fill material or how the groundwater in the fill and the sand unit may interact. In addition, though the clay unit may separate the groundwater in the fill and sand from the bedrock below, BASF has not presented any data to support this conclusion. Also, the statement "Groundwater discharge from the Facility is restricted by the groundwater extraction system and the steel retaining wall ..." is not supported by the potentiometric maps (Figures 7-11 through 7-15) which still indicate flow towards the river at varied locations on the site. BASF should provide additional information to further clarify the site hydrogeology and to support any statements made in the RFI Report.

3. BASF does not include a figure showing the locations of any of the buried pipelines at the facility, nor does the RFI discuss the potential for shallow groundwater to preferentially flow along the backfill of the various pipelines buried throughout the facility. In Section 3.8.2, Release Controls, page 3.10, the report mentions storm sewer improvements to prevent groundwater from infiltrating the sewer lines, but ends the discussion at that point. BASF should provide additional discussion regarding this issue.

Section 7.1.1.3, Geological Cross-Sections, pg. 7-4.

4. The report states that "The cross-sections corroborate the description of this unit as provided in Section 7.1.1.1." The cross-sections were developed from the geologic logs which were also used to develop the description of each unit indicated in Section 7.1.1.2 (not Section 7.1.1.1). To say the cross-sections corroborate the descriptions is circular reasoning. Revise the RFI Report to clarify and/or correct these discrepancies.

Section 7.1.2.2, Groundwater Elevation Data, pg. 7-7.

5. BASF reports that groundwater at the facility flows generally in a west-southwest direction. This direction is based in the potentiometric surfaces shown in the figures included in Appendix C. The report also includes potentiometric surfaces in figures included in Section 7 (Figures 7-11 through 7-15). These figures indicate an eastwardly flow in the northern third of the facility, a south and southeastwardly flow in the central portion of the facility, and a south and southwestwardly flow in the very southern portion of the facility in August 1997. In fact, the flow direction in the extreme southern portion of the facility changes direction between June 1997 and August 1997. BASF never discusses the various directions of flow or attempts to explain what may be happening. BASF should provide additional discussion regarding the variability of groundwater flow and revise the RFI Report to remove generalization in the groundwater flow direction, not supported by data.

Section 7.1.2.3, Step Drawdown Test Results, pgs. 7-10 and 7-11.

6. BASF refers to the Peat and Clay Unit as an aquitard and a confining layer and further states that the shallow groundwater is divided into two distinct units. BASF has not provided any data to confirm this conclusion. Also, since the purpose of the RFI was to determine the extent of any release, it is unclear why BASF only monitored the lower of the two units. It should be noted that in Section 3.1.3, that BASF discusses the shallow groundwater as first occurring in the fill and that the Glaciolacustrine Unit prevents vertical migration. There is no mention in the Site Hydrogeology of the shallow groundwater being divided into two distinct units or the Peat and Clay Unit acting as an aquitard. Provide additional information to clarify this issue.
7. If vertical hydraulic separation takes place within the shallow groundwater, BASF should provide water level data and groundwater profile maps that indicate the separation. However, since BASF only monitored the "lower" of the two units, there is no data, at this time, to support or disprove this conclusion. Provide additional discussion on this issue and indicate whether data is available to support the assumptions made.
8. Also, at the top of page 7-11, the report again indicates that groundwater flow is to the southwest. Only the very southern portion of the facility seems to have groundwater flow in this direction. BASF did not indicate the direction of flow on any of the figures as is typically done with flow lines and/or arrows. Revise the RFI Report as necessary to correct these discrepancies.

Section 7.1.2.4, Estimation of Capture Zones, pgs. 7-11 and 7-12.

9. The report indicates that hydraulic gradients were taken from the potentiometric surface map for August 10, 1997 (Figure C-10). It should be noted that Figure 7-15 is also a potentiometric map for August 10, 1997. However, the two maps are not the same. Water levels vary by nearly one foot between the two maps. Revise the RFI Report, and relevant figure to correct these discrepancies.
10. In addition, at the bottom of page 7-11, the report

indicates that the capture zone model is incompatible with the actual subsurface conditions but that the model was used to establish a comparative baseline for future evaluations. Section 3.0 indicates that the extraction wells are preventing the migration of contaminants at three of the SWMUs and all five of the AOCs. Though the report does not state that the capture zone analysis confirms the no migration assumption, the report implies that BASF has confirmed that the extraction wells are capturing any contaminated groundwater, and typically this is done through a capture zone analysis (which in this case was done with an incompatible model). Provide additional discussion to clarify this issue, including steps necessary to evaluate the effectiveness of the system in capturing contaminated groundwater. In addition, provide steps, and or methods that will be used, to verify the result of these assessments.

Section 7.1.4, Evaluation of Groundwater Extraction System Efficiency, pg. 7-13.

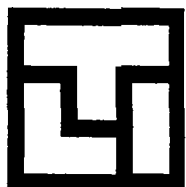
11. The last paragraph on page 7-13 discusses a groundwater divide "(roughly parallel to the river along the eastern side of the Facility)". This conclusion was deduced from Figure 7-15. Without the presence of flow lines, it is difficult to determine where BASF believes the divide to exist. It appears that there may be a divide running east-west in the northern half of the site, but not parallel to the river. Clarify this discrepancy.

Section 7.4.4, Summary of Groundwater Analytical Results, pg. 7-41.

12. The report concludes that the groundwater extraction system is controlling the spread of hazardous constituents present in the groundwater. However, as noted in this same section, several groundwater samples collected from near the river have shown elevated levels of hazardous constituents. This appears to contradict the conclusion that the hazardous constituents are being controlled. Provide additional discussion on the effectiveness of the system to capture contaminated groundwater, as well as to indicate and discuss any shortfalls in the system which will need to be addressed.

Section 7.5, Groundwater Field Measurement Results, pg. 7-42.

13. The report only makes passing comment of the high pH values (in excess of 12). The report does not mention that by having a pH greater than 12, the ground water is a characteristic hazardous waste. Also see General Comment 1 relating to this issue.



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RZ2-R05020.01.ID.196

March 9, 1998

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5, DRE-9P
77 West Jackson Boulevard
Chicago, IL 60604

Reference: EPA Contract No. 68-W4-0006; Work Assignment No. R05020; Corrective
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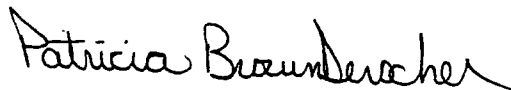


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cc: F. Norling, U.S. EPA Region 5 (w/out attachment)
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TASK 09 DELIVERABLE

Submitted to:

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Submitted By:

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Chicago, Illinois 60606**

EPA Work Assignment No. :	R05020
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TechLaw WAM:	Patricia Brown-Derocher
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Section 7.1.4, Evaluation of Groundwater Extraction System Efficiency, pg. 7-13.

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From: John Koehnen <JGK@techlawinc.com>
R5WST.R5RCRA(SHARROW-DIANE)
Date: 2/18/98 11:13am
Subject: BASF Status

** High Priority **

Diane:

Just a quick update to let you know how things are going on BASF.

As you know, we had a few questions regarding the Geology and Hydrogeology at the site. We posed these questions directly to Doug Marian of QST. He had received permission to respond to our request and we further discussed the information we needed. However, as of today, we have still not received the package of additional data. It appears that Bruce Roberts at BASF required that the package go out under a BASF letterhead. At this time, it may go out as early as today (Wednesday) for Thursday delivery, but that is not certain.

Otherwise, Steve has basically completed his review, with the exception of evaluating the additional data and determining whether that information changes any of his comments. With respect to the review of the data validation reports for BASF, our DVR's and Chemist will be finished today or tomorrow. To the extent possible, I will summarize the main concerns in a forthcoming E-mail so that you can determine whether these issues should be agenda items for your meeting. The E-mail summary would then be followed by an official hard copy and electronic deliverable for the review of the BASF RFI Report, Geology Section and the review of the BASF DV Reports.

I would assume at this time that attendance of a TechLaw representative at the March 16 meeting is not critical. However it may be advisable to have Steve, and/or myself, on via teleconference in case they have specific questions/concerns over the comments generated. Just let me know and we can work out whatever you require. However, in case you are interested in having one or more TechLaw personnel in attendance, FYI: Steve (geology) lives in the Dallas, TX area; Bob (Data Validation review) lives in Denver; and I am in Chicago.

Again, I will send another E-mail to you later today or tomorrow morning which lists, in bullet point format, some of the main concerns noted during the TechLaw reviews. If you have any questions, please feel free to call. Also, we will send the hard copy and electronic copy of these deliverables to you in the near future. However, since we have not yet received the data from QST/BASF, do you want us to wait in that deliverable until we get the data or send it now and resolve any concerns later? Let me know!

CC: R5CHG.IN("SPhillips@techlawinc.com","PBrown-Deroch...

① ~~Call John~~
312-345-8938

② Call Bruce
- ancillary
pump data
- sediments
- QA
734 324 6000
Fax
734 324-
6775
- EPA Letter
06 2/2/98

Yes

Yes

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5**

DATE: December 9, 1997

SUBJECT: Technical Direction Regarding Draft RFI Phase I Review of Hydrogeology and Data Validation for the BASF, Inc., North Works, Wyandotte, Michigan Facility, U.S. EPA ID No. MID 064 197 742

FROM: Diane Sharrow, Environmental Scientist
Technical Contact

THROUGH: Brian Freeman, Senior Chemist
Work Assignment Manager

TO: Patricia Brown-Derocher, Regional Manager
TechLaw, Inc.

This Technical Direction Memorandum (TDM) under Contract No. 68-W4-0006, WA #R05020 is to request review of the Facility RFI. The review should concentrate on review of hydrogeology, as well as the data validation reports and analytical laboratory data. The review should include the results obtained from analysis of split sampling activities at the Facility (see attached). A copy of the RFI (4 boxes) can be obtained from the Technical Contact.

BACKGROUND:

The Facility is subject to RCRA corrective action requirements under an Administrative Order on Consent (AOC). The AOC was issued by the United States Environmental Protection Agency (U.S. EPA) on February 14, 1994. The Facility is located at 1609 Biddle Ave., in Wyandotte, Michigan, and totals approximately 230 acres, with its eastern border formed by the Detroit River/Trenton Channel. While under the ownership of BASF, the Facility known as the North Works, has engaged in the manufacture and conducted research and pilot activities in support of manufacturing, industrial inorganic chemicals, polyether polyol resins, etc. Historical activities date to the late 1800's, and include the manufacture of soda ash and coke.

Approximately 1/2 to 2/3's of the facility is reclaimed marshland and riverbottom, filled to bring the site to the approximate present grade with cinders, limestone, gravel, cobble, coal, timbers, concrete, etc. The fill material occupies the full length of the facility in a wedge 22 feet thick near Biddle Ave., extending to 1000 feet wide to the north, to about 2400 feet in width across the center of the facility. Surficial fill, fluvial sand and peat make up the upper-most hydrogeologic system at the facility, with undetermined hydraulic communication with hydrogeologic systems beyond the facility boundary.

Technical review of the RFI, with an emphasis on the hydrogeological evaluation of the current pump and treat system, as well as data validation reports and analytical laboratory data, is required to assess Facility conclusions on the contamination of the Detroit River. Submission of a draft of the review is required prior to a presentation of the RFI by the Facility in late January 1998. Attendance at this presentation will be required prior to completion and submission of the final review.

If you have any questions on this TDM, please call Brian at 353-2720 or me at 886-6199.

Attachment

RZ2.R05020.01.ID.105

ATTACHMENT

January 16, 1996

Ms. Ann Kerbs
U.S. Environmental Protection Agency
Region 5 DRE-8J
77 West Jackson Boulevard
Chicago, Illinois 60604

Reference: EPA Contract No. 68-W4-0006; Work Assignment No. R05020; Corrective Action Oversight and Split Sampling; BASF Corporation; Wyandotte, MI; EPA ID No. MID064197742; BASF-North Works Facility Field Oversight and Split Sampling Report; Task 07 Deliverable

Dear Ms. Kerbs:

Please find enclosed A.T. Kearney's Field Oversight and Split Sampling Report for the BASF-North Works Facility in Wyandotte, Michigan. Also enclosed is an electronic copy of this report formatted in Word Perfect 6.1 for Windows. Per your request, the associated data packages are being delivered directly to Ms. Diane Sharrow, U.S. EPA Region 5.

As we have discussed, this report has been delayed due to difficulties obtaining the complete data package from A.T. Kearney's subcontractor laboratory, Inchcape Testing Services in Richardson, Texas. The final pages were delivered to A.T. Kearney today and have been included in this report and in the data package. I once again can but apologize for the delays and assure you that A.T. Kearney has initiated and will continue to pursue corrective actions to prevent such delays in the future. We are currently in the process of adding an additional laboratory, Lancaster Laboratories, to the Kearney Team. We have worked with Lancaster Laboratories before and have found them to be reliable both in terms of analytical and schedule requirements.

Please note that while a basic completeness review of the data package has been performed by project staff, the data has not, per Ms. Sharrow's instructions, been validated. Therefore, while it appears that the package is now complete, no assurances of the reliability of the data are being made at this time. In addition, a cursory review of the data, performed as part of our internal QA program, did not identify any immediate significant issues concerning this data package.

Ms. Ann Kerbs
January 16, 1997

Page 2

Please feel free to contact me or Mr. John Koehnen at (312)223-6253 if you have any questions.

Sincerely,

Patricia Brown-Derocher
Regional Manager

cc: F. Norling, EPA Region 5 (w/out attachment)
D. Sharrow, EPA Region 5
B. Jordan
A. Williams
J. Koehnen

**BASF CORPORATION
EPA ID NO. MID064197742
FIELD OVERSIGHT AND SPLIT SAMPLING REPORT
FOR SOIL AND GROUNDWATER SAMPLING**

Submitted to:

**Ms. Ann Kerbs
U.S. Environmental Protection Agency
RCRA Enforcement Branch
Region 5 DRE-8J
77 West Jackson Boulevard
Chicago, Illinois 60604**

Submitted by:

**A.T. Kearney, Inc.
222 West Adams Street
Chicago, Illinois 60606**

**EPA Work Assignment No.
Contract No.
Kearney WAM
Telephone No.
EPA WAM
Telephone No.**

**R05020
68-W4-0006
Patricia Brown-Derocher
312/223-7088
Ann Kerbs
312/886-3901**

January 16, 1997

BASF CORPORATION
EPA ID NO. MID064197742
FIELD OVERSIGHT AND SPLIT SAMPLING REPORT
FOR SOIL AND GROUNDWATER SAMPLING

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**BASF CORPORATION
EPA ID NO. MID064197742
FIELD OVERSIGHT AND SPLIT SAMPLING REPORT
FOR SOIL AND GROUNDWATER SAMPLING**

1.0 SUMMARY OF FIELD ACTIVITIES

Oversight of sampling activities and split sampling of soil and groundwater sampling activities were conducted at the BASF - North Works Facility in Wyandotte, Michigan (BASF facility), by Mr. John Koehnen of A.T. Kearney, Inc. on the following dates:

- August 20 and 21, 1996;
- September 11 and 12, 1996; and
- September 26, 1996.

Prior to each oversight inspection or split sampling visit, the A.T. Kearney Team contacted the facility's contractor, Environmental Science & Engineering (ES&E), to clarify the anticipated activities and daily work schedules. This allowed the Kearney Team to schedule site visits to ensure that those areas where split samples were desired would be sampled during the visit.

The following personnel were involved, either at the BASF facility or via telephone, at various times during the field oversight and split sampling activities:

Ms. Diane Sharrow, EPA Project Manager
Mr. Bruce Roberts, BASF Project Manager
Mr. Doug Murphy, ES&E Site Manager (initial)
Mr. Doug Marian, ES&E Site Manager (replacement)
Ms. Kathy Hillig, BASF Chemist
Ms. Becki Kammerer, ES&E Geologist
Mr. Ken Stringer, ES&E Geologist
Mr. Mark Kimball, ES&E Field Technician
Mr. Kieth Boyle, ES&E Field Technician
Mr. S. Johnson, ES&E Field Technician
Mr. Karl Kramer, ES&E Field Technician
Mr. Paul Libby, Carlo Environmental Technology (CET) Driller
Mr. Craig Pisarsky, CET Drillers Aide
Mr. Ben Black, CET Drillers Aide
Mr. John Koehnen, A.T. Kearney Field Representative

This report describes the significant field oversight observations and split sampling activities that took place during oversight at the BASF facility.

Field Oversight Observations

Brief discussions of the notable observations made during each day of oversight and split sampling activities at the BASF facility are presented below. If during the oversight activities deviations were observed, the A.T. Kearney field representative provided immediate feedback to the ES&E and BASF personnel to ensure that corrective actions were taken. These deviations and the resulting corrective actions are discussed in greater detail at the end of Section 1.

August 20, 1996

Mr. Koehnen arrived at the BASF facility at 0705 and met with Mr. Roberts, Mr. Murphy and Mr. Marian immediately prior to attending the BASF site specific health and safety briefing. The weather was moderate with a temperature of approximately 75°F, and a light breeze and clear skies. BASF personnel anticipated sampling at the SWMU G area and AOC 2. Following the briefing, Mr. Koehnen again met with the ES&E personnel and proceeded to the SWMU G area to observe sampling operations and collect a split sample.

Mr. Kimball was in the processes of decontaminating the field equipment and preparing sampling containers. After observing sampling activities at a number of grid nodes, A.T. Kearney collected a split soil sample and field duplicate from grid node 94. Mr. Koehnen then proceeded to the AOC 2 area to observe the performance of soil borings along the approximate perimeter of the unit. A lunch break was taken from 1100 to 1203. Upon returning from lunch, Mr. Koehnen observed boring and field screening operations at several locations along the perimeter of AOC 2. Due to the limited success in finding an area potentially unaffected by AOC 2, no additional samples or split samples were collected for analysis. Operations at AOC 2 continued to approximately 1550 and Mr. Koehnen left the BASF site at approximately 1615.

August 21, 1996

Mr. Koehnen arrived at the BASF facility at 0713 and discussed deviations noted at the end of the prior day's activities. Sampling and boring activities resumed in the AOC 2 area. At 0829 boring and sampling was initiated at location AOC 2-5. The A.T. Kearney field representative collected a split sample at this location. Following collection of the A.T. Kearney split sample, Mr. Koehnen continued to observe the sampling and boring operations at the AOC 2 area. In addition, Mr. Koehnen also labeled and tagged the sample containers for subsequent shipment to the laboratory. Sampling activities at AOC 2 continued to approximately 1045 at which time Mr. Koehnen returned to the ES&E field trailer to continue sample management. A lunch break was taken from 1149 to 1235. Mr. Koehnen left the site for the day at 1350. The samples collected over the last two days had been maintained in the custody of Mr. Koehnen and then shipped via Federal Express to the A.T. Kearney subcontractor laboratory.

September 11, 1996

Mr. Koehnen contacted ES&E personnel early in the morning. Due to an exposure event that had occurred late the previous night, the initiation of sampling activities were postponed until

later in the morning. Mr. Koehnen arrived at the BASF facility at 1150. The weather was moderate with temperature of approximately 75°F, and moderate winds and clear skies. Activities were not expected to be initiated until after noon. At 1352, Mr. Koehnen met with ES&E personnel at the SWMU H area. This unit consists of a filled in trench which runs east-west in the center of the facility. The exposure event the previous day occurred within the boundary of this unit along the extreme western end of the unit. Mr. Koehnen observed the sampling operations at this unit. Sampling consisted of using a hydraulic punch to penetrate the ground with a core tube sampler. The samples were then extracted and monitored with a flame ionization detector (FID) to note any elevated headspace readings. Samples were collected from the surface to approximately 16 feet with the samples to be sent for analysis being determined through the FID analysis.

Sampling activities continued at SWMU H for the remainder of the day. Many of the samples collected exhibited elevated headspace readings as determined from the FID. Therefore, the ES&E personnel completed sampling in Level C PPE. The A.T. Kearney field representative did not collect any split samples from this area. Late in the afternoon a storm was noted to be heading toward Wyandotte and the BASF facility. The sampling activities continued up to the last minute and were halted once lightning was observed near the facility. All personnel left the field at 1700 and Mr. Koehnen left the site for the day at 1730.

September 12, 1996

Mr. Koehnen arrived at the BASF facility at 0737 and met with ES&E personnel regarding the days activities. The weather was cool (60-65°F) with patchy clouds and chance of rain. Mr. Koehnen proceeded to the southern end of the facility to meet with the ES&E and CET representatives who were performing well development activities at well E2NA, a former production well located to the south of the main facility. Many of the older wells were scheduled for development, however a significant level of calcium carbonate had built up in the wells making development difficult since the flow into the wells was limited. Therefore, ES&E and CET opted to introduce "Newell", which is an inhibited sulfamic acid, into these wells to break down the deposits which have been formed on the screens. This material appeared to be effective in removing some of the scale and increasing the volume of flow into the wells.

The CET personnel purged the well with the system pump on the drill rig. The pump hose was lowered into the well and suction applied. However, due to conditions where prime in the well was lost, additional water was added to the well to prime the pump. Pumping continued until approximately five well volumes had been removed and parameter stabilization achieved. At 0958 Mr. Koehnen left the well development team and proceeded to the SWMU H area to meet with other ES&E personnel who had continued with boring and sampling operations at SWMU H. A lunch break was taken from 1149 to 1247.

Mr. Koehnen returned to observe well development activities. The former production wells had improved but the flow of groundwater into these wells was still restricted. The wells were pumped dry and allowed to recharge and then pumped dry again. In addition, a surge block was used to try to force the obstructions free. Mr. Koehnen continued to observe well development activities until 1435. At 1435 Mr. Koehnen returned to SWMU H to check on

the status of activities at this unit. The boring and probing activities at the unit had progressed and elevated FID readings were still being encountered. Field activities were continuing to occur under Level C conditions. ES&E personnel indicated that activities at SWMU H would continue throughout the day. Mr. Koehnen then discussed the day's observations with the ES&E personnel and left the site for the day at 1525.

September 26, 1996

Mr. Koehnen arrived at the BASF facility at 0655. The weather was cool (60°F) with cloudy skies and rain expected. Due to the darkness and misty weather, ES&E personnel initiated the collection of a equipment blank using a new disposable bailer. ES&E personnel were preparing to initiate groundwater sampling activities. ES&E personnel indicated that two of the four wells which U.S. EPA was interested in sampling had already been inadvertently sampled. Therefore, only wells MW-15 and MW-16 which are adjacent to AOC 2 were available to be sampled. Since U.S. EPA had desired to collect samples from wells MW-4 and MW-5, which are considered site perimeter wells but had already been sampled, the A.T. Kearney field representative determined that MW-2 would be sampled instead. At 0800, ES&E personnel and Mr. Koehnen proceeded to well MW-15. The pre-sample purging of well MW-15 was initiated at 0833 using a truck mounted submersible pump. A predetermined volume of water was removed, followed by parameter stabilization. The well was then sampled using a clean disposable bailer for filling all of the sampling containers. A.T. Kearney collected a split sample at MW-15 as well as a duplicate sample. Sampling was complete at 0942 and preparations were made to move to the next well location.

At 1003, pre-sample purging was initiated at MW-16. The resulting groundwater was very dark brown and moderately foamy, with a root beer like appearance. A decision was made by the A.T. Kearney field representative to sample this well in addition to MW-15 and MW-2. During the sampling activities, FID readings did not indicate the presence of volatile organic compounds (VOCs). Following the pre-sample purging with the submersible pump, the appearance of the groundwater cleared slightly. The samples were again collected using a clean disposable bailer which was discarded after use. Sampling activities were completed at MW-16 at 1130. A lunch break was taken from 1217 to 1305.

Upon returning from lunch, ES&E personnel and Mr. Koehnen proceeded to well MW-2. The ES&E personnel prepared to initiate sampling at well MW-2. Sampling was initiated at 1445. The groundwater was generally clear and the parameters stabilized prior to sampling. The pre-sample purging was performed using a submersible pump while the samples were collected using a clean disposable bailer. Sampling at MW-2 was completed at 1540 and ES&E personnel moved to the next in a series of wells. The A.T. Kearney field representative accompanied the ES&E personnel to the next well. However, the samples collected from MW-15, MW-16 and MW-2 were prepared for shipment to the laboratory at this time and no additional rigorous oversight occurred. ES&E personnel completed their sampling activities shortly after 1600. Mr. Koehnen remained in the field near MW-2 to complete sample preparation and packaging activities. All samples were prepared and packaged by 1825 and delivered to Federal Express at the BASF site at 1900. Mr. Koehnen left the BASF site at 1900.

Deviations and Corrective Actions

ES&E appeared to conduct the majority of the field procedures in accordance with the U.S. EPA-approved RFI Work Plan and Quality Assurance Project Plan (QAPP) during the A.T. Kearney oversight. However, several activities or procedures were noted to deviate from the conditions anticipated in the RFI Work Plan and QAPP. These deviations, and the applicable corrective actions, are described below:

- During the soil sampling activities at SWMU G/AOC 6, Mr. Koehnen observed the ES&E personnel (Mr. Kimball) using the same disposable nitrile gloves for placing the samples into the sampling containers as were used in decontaminating the sampling equipment and in digging up the sample media. This deviation was communicated directly to Mr. Marian and Ms. Hillig who were accompanying Mr. Koehnen at this time. Mr. Marian noted this concern and immediately communicated a new procedure, as presented in the U.S. EPA-approved Sampling Plan and QAPP for BASF. Mr. Kimball immediately replaced his gloves and replaced the gloves at appropriate junctures during the sampling activities.
- During the oversight and split sampling in the SWMU G/AOC 6 area, Mr. Koehnen observed the ES&E personnel numbering the samples with the AOC 6 designator. Mr. Koehnen questioned the ES&E personnel who indicated the samples being collected would actually be assigned to the AOC 6 investigation. Mr. Koehnen requested further clarification from the ES&E personnel and Ms. Hillig. It was determined later that day that the correct designation should have been SWMU G. However, these affected samples had already been shipped to the analytical laboratory. The following day, Mr. Marian indicated that ES&E intended to send in a corrected chain of custody and to request that the laboratory make necessary revisions to the sample labels.
- Mr. Koehnen noted that during the headspace analysis, which was identified as a critical step in the investigation at several of the SWMUs and AOCs, an appropriate aliquot of the (potential) sample was not containerized and stored in a cooler at 4°C during the decision making process. The decision making process involved the collection of several headspace readings, using an FID to determine which samples would be sent to the laboratory for analysis. Hence, the potential samples should be maintained as if they were environmental samples until the decision is made to exclude a sample. This procedure was communicated to Mr. Marian who initiated corrective actions by instructing ES&E personnel to collect and store sample aliquot until the decision making process was complete.
- During well development activities at the southern end of the facility, Mr. Roberts mentioned BASF's intent to install a replacement well along the southwestern facility boundary to replace a damaged well. This was warranted since these wells serve as a source of background information. However, Mr. Roberts proceeded to state that he had instructed the drillers to install and develop the well in the same day. Mr. Koehnen met with Mr. Roberts and Mr. Marian and stated that the installation and development of a well within the same day, or even with a short period in between, was not appropriate. The short time interval does not allow the well and supporting

construction to set up properly and immediate or near immediate development would likely have a negative impact upon the filter pack around the screen and the quality of the resulting groundwater analysis. In addition, Mr. Koehnen indicated that the BASF Sampling Plan and Standard Operating Procedures were not in agreement with this procedure. Mr. Marian agreed and both individuals stated that an appropriate time period would pass between well installation and well development.

- During well development activities, Mr. Koehnen observed that the tubing associated with the drilling rig mounted pump was often laid directly on the ground surface. This tubing was later deployed down into the well to pump out the groundwater. Mr. Koehnen noted, and discussed with Mr. Boyle, that this tubing should be managed to minimize the potential for cross contamination. In addition, while no SOP was noted or procedures spelled out, it is advisable for ES&E to determine whether a high capacity vacuum pump was the most appropriate equipment to be used for well development. Mr. Boyle stated he would pass on these concerns.
- During the well sampling activities, Mr. Koehnen observed the use of a bailer and rope without the use of a catch bucket or visquene ground cover to prevent contamination of the bailer rope. Mr. Koehnen noted these concerns to Mr. Boyle, who immediately initiated the use of a five gallon bucket to catch any spillage or leakage associated with the groundwater sampling using a disposable bailer. However, Mr. Boyle indicated their intent to keep all sampling materials (i.e., bailer and rope) above the ground surface and in the samplers hands at all times, alleviating the need for a liner or ground cover. Mr. Koehnen observed the sampling activities to verify this statement. All sampling observed resulted in retention of the bailer and rope in the samplers hands and above the ground surface.

In summary, the types and nature of the deviation/deficiencies seemed to result from a lack of familiarity with the approved sampling plan and/or QAPP. This issue was discussed briefly with Mr. Marian who agreed that he would request that field personnel review these documents prior to initiating field activities. For the sampling activities observed, the impact of the noted deficiencies/deviations could not be assessed, nor was it determined whether the deficiencies/deviations noted occurred prior to the oversight and split sampling visit where they were identified and potentially corrected.

2.0 SUMMARY OF SPLIT SAMPLING ACTIVITIES

The A.T. Kearney field representative collected two soil split samples and three groundwater split samples at the BASF facility. In addition, a duplicate soil and a duplicate groundwater sample, and required quality control samples (trip blank, MS/MSD) were collected. Each of the samples was analyzed for Appendix IX VOCs, semivolatile organic compounds (SVOCs), metals, cyanide and sulfide using the sample preparation and analytical methods specified in the A.T. Kearney Site-specific Sampling and Analysis Plan (SAP). In addition, one sample of each media was collected and analyzed for herbicides and pesticide/PCB. Sample collection and shipping procedures outlined in the A.T. Kearney SAP were followed. A.T. Kearney

sample designations, laboratory sample designations, corresponding SWMU locations and date and time of collection are presented in Table 1. A.T. Kearney sample designations correspond to those assigned by ES&E in the field.

Soil samples SS001SWMUG-5 and SS001SWMUG-105 were collected from grid node 94 located along the access road in the southern portion of the BASF facility. This area includes the SWMU G and AOC 6 areas which overlap boundaries to the east of the sampling location. The sample collected was a dark brown silty sand with a gravelly mix and moderate amount of organic materials. The sample was collected using a stainless steel trowel and bowl to accumulate all of the sample media, except for the aliquot collected for VOC analysis, which was placed directly into the sampling container. A split sample and a field duplicate sample were collected by the A.T. Kearney field representative at this location.

Soil sample SG002AOC2-5 was collected from an area located across from the safety and engineering building along Wyandotte Drive. The soil conditions in the area were characterized by a hard gravel packed surface with the sample location adjacent to a surface road to the north and an open field to the south. A large storm water manhole is located approximately 30 feet to the west of the sampling location. The sample material collected was mostly sandy and cobble, and was collected from the upper saturated zone. The sample containers were filled directly from the materials in the split spoon sampler.

Groundwater samples MW000RFIMW16, RFIMW15 and RFIMW115F were collected from two wells located immediately east of the AOC 2 boundary. These wells were installed to monitor down gradient groundwater quality resulting from this unit. The wells were purged of approximately five well volumes, and parameter stabilization established. The resulting purge water was containerized and disposed in the on-site wastewater treatment facility. The wells were sampled using a truck mounted submersible pump followed by filling of the actual sampling containers using a disposable Teflon bailer. The condition of these wells was good and the groundwater from RFIMW15 and it's duplicate RFIMW115F was generally clear to cloudy, while samples from MW-16, designated as sample MW000RFIMW16 started out a dark brown with a light foaming. Following pre-sample purging, the appearance of the water at well MW-16 cleared up slightly but did not at any point become clear. Well RFIMW15 was located along the eastern boundary of AOC 2 to the north while RFIMW16 was located along the eastern boundary and to the south.

TABLE 1
SAMPLE LOCATION SUMMARY

A.T. Kearney Sample Number ¹	Laboratory Sample Number	Sample Type and Location	Date/Time of Collection	Analytes/Comments
SS001SWMUG-5	9653-1	Soil (SWMU G)	8/20/96 - 1012	Appendix IX VOCs, SVOCs, metals, herbicides, pest/PCB, cyanide, sulfide
SS001SWMUG-105 (duplicate of SS001SWMUG-5)	9653-2	Soil (SWMU G)	8/20/96 - 1012	Appendix IX VOCs, SVOCs, metals, herbicides, pest/PCB, cyanide, sulfide
SG002AOC2-5	9653-3	Soil (AOC 2)	8/21/96 - 0829	Appendix IX VOCs, SVOCs, metals, cyanide, sulfide
MW000RFIMW2	10809-3	Groundwater (Well MW-2)	9/26/95 - 1445	Appendix IX VOCs, SVOCs, total and dissolved metals, herbicides, pest/PCB, cyanide, sulfide
MW000RFIMW16	10809-1	Groundwater (Well MW-16)	9/26/96 - 1100	Appendix IX VOCs, SVOCs, total and dissolved metals, cyanide, sulfide
RFIMW15	10809-4	Groundwater (Well MW-15)	9/26/96 - 0910	Appendix IX VOCs, SVOCs, total and dissolved metals, cyanide, sulfide
RFIMW115F (duplicate of RFIMW15)	10809-5	Groundwater (Well MW-15)	9/26/96 - 0910	Appendix IX VOCs, SVOCs, total and dissolved metals, cyanide, sulfide

1. A.T. Kearney sample designations correspond to those assigned by the ES&E field team.

Groundwater sample MW000RFIMW2 was collected from a perimeter well located in the northeastern portion of the facility. This well is adjacent to the fire training area and approximately 100 feet from the river. The wells were sampled using a truck mounted submersible pump followed by filling of the actual sampling containers using a disposable Teflon bailer. The wells were first purged of approximately five well volumes and parameter stabilization reached. The resulting purge water was containerized and disposed in the on-site wastewater treatment facility. The groundwater was generally clear and did not exhibit any elevated FID readings.

3.0 SUMMARY OF ANALYTICAL RESULTS

All split soil and groundwater samples were analyzed for Appendix IX VOCs, SVOCs, metals, and cyanide and sulfide. In addition, certain samples were also analyzed for herbicides and pesticide/PCB constituents. The samples were analyzed at the Inchcape Testing Services laboratory in Richardson, Texas, as specified in the A.T. Kearney SAP. Analytical results are briefly summarized below for each split sample location. The sample number designations below are those generated by A.T. Kearney in the field. These sample numbers mirror those generated and used by ES&E. The correlation between the A.T. Kearney sample designations and the laboratory designation is included in Table 1. The data presented here has not, per U.S. EPA instructions to A.T. Kearney personnel, been validated. Therefore, no conclusions concerning the reliability of this data are either stated or implied in this report.

Table 2, as discussed below, presents results only for those organic target compounds detected in the field samples. The laboratory summary sheets which include all target compound results, are included in Appendix C of this report. In addition, a complete copy of the analytical data package provided by Inchcape Testing Services has been submitted to Ms. Diane Sharrow, the U.S. EPA Project Manager for the BASF facility.

Soil

Soil Sample SS001SWMUG-5 (SWMU G) - One VOC compound (methylene chloride, a common laboratory contaminant) and 13 SVOC compounds, primarily polynuclear aromatic hydrocarbons (PNAs), were detected in this sample. In addition, 22 tentatively identified compounds (TICs) were reported, the majority of which appear to be various alkane and substituted-naphthalene compounds. Two pesticides (beta-BHC and heptachlor), Aroclor 1260 and one herbicide (2,4-D) were also reported in the sample at concentrations above the associated laboratory detection limits. The reported concentrations for all detected target organic compounds are presented in Table 2, and the metals, cyanide and sulfide results are presented in Table 3 of this report.

Soil Sample SS001SWMUG-105 (SWMU G - duplicate of SS001SWMUG-5) - One VOC compound (methylene chloride, a common laboratory contaminant) was reported for this sample, showing agreement with the VOC results reported for sample SS001SWMUG-5, the field duplicate of this sample. Positive results were reported for sixteen semivolatile compounds, again primarily PNAs. Eighteen TICs were identified as various alkane and

substituted-naphthalene compounds. One pesticide (heptachlor), Aroclor 1260 and one herbicide (2,4-D) were also reported in the sample at concentrations above the associated laboratory detection limits. The reported concentrations for all detected organic target compounds are presented in Table 2, and the metals, cyanide and sulfide results are presented in Table 3 of this report.

Soil Sample SG002AOC2-5 (AOC 2) - The only VOC or SVOC detected in this sample was methylene chloride, a common laboratory contaminant. The reported concentration of the detected organic target compound is included in Table 2, and the metals, cyanide and sulfide results are presented in Table 3 of this report.

Groundwater

Groundwater Sample MW000RFIMW2 (Perimeter) - There were no target VOCs detected in this sample. One TIC, trimethylsilanol, was reported as present in the sample. Two SVOCs, bis(2-chloroethyl)ether and 4-methylphenol, were reported. There were no pesticide/PCB or herbicide target compounds reported as present in this sample. The reported concentrations of the detected organic target compounds are included in Table 2, and the metals, cyanide and sulfide results are presented in Table 4 of this report.

Groundwater Sample RFIMW15 (AOC 2) - No VOCs were reported as present in this sample above detection limits. The only SVOC reported for the first analysis of this sample was bis(2-ethylhexyl)phthalate, a common laboratory contaminant. However, no SVOCs were detected upon reanalysis of the sample. The reported concentrations of the detected organic target compound is included in Table 2, and the total and filtered metals, cyanide, and sulfide results are presented in Table 4 of this report.

Groundwater Sample RFIMW115 (AOC 2 - duplicate of MW000RFIMW15) - There were no target VOC, target SVOC, or TICs detected in this sample. The total and filtered metals, cyanide, and sulfide results are presented in Table 4 of this report.

Groundwater Sample MW000RFIMW16 (AOC 2) - Two VOCs, acetone and carbon disulfide, were reported as detected in this sample. The reported concentration for acetone was significantly elevated at 328 ug/L. Three SVOCs, phenol, 4-methylphenol and benzoic acid, were detected in the sample, with an elevated phenol concentration of 228 ug/L. In addition, 21 TICs, consisting primarily of unknown ethers, were reported. Reanalysis of the SVOC portion of this sample confirmed the three SVOC detects and TICs identifications discussed above. The reported concentrations of the detected organic target compounds are included in Table 2, and the total and filtered metals, cyanide, and sulfide results are presented in Table 4 of this report.

TABLE 2 - DETECTED ORGANIC TARGET COMPOUNDS

Sample Number	SS001SWMUG-5	SS001SWMUG-105	SG002AOC2-5	RFIMW2	RFIMW15	RFIMW115	RFIMW16
Matrix (Units)	Soil (ug/kg)	Soil (ug/kg)	Soil (ug/kg)	Water (ug/L)	Water (ug/L)	Water (ug/L)	Water (ug/L)
Methylene Chloride	12.0	8.6	11.0	Not detected	Not detected	Not detected	Not detected
Acetone	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	328
Carbon disulfide	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	2.9
Phenol	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	228
bis(2-Chloroethyl)ether	Not detected	Not detected	Not detected	47.4	Not detected	Not detected	Not detected
4-Methylphenol	Not detected	Not detected	Not detected	88.9	Not detected	Not detected	11.6
Benzoic acid	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	29.0 J
Naphthalene	656	425	Not detected	Not detected	Not detected	Not detected	Not detected
2-Methylnaphthalene	995	667	Not detected	Not detected	Not detected	Not detected	Not detected
Acenaphthylene	Not detected	120 J	Not detected	Not detected	Not detected	Not detected	Not detected
Dibenzofuran	272 J	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected
Phenanthrene	770	622	Not detected	Not detected	Not detected	Not detected	Not detected
Anthracene	Not detected	81.4 J	Not detected	Not detected	Not detected	Not detected	Not detected
Di-n-butylphthalate	Not detected	43.4 J	Not detected	Not detected	Not detected	Not detected	Not detected
Fluoranthene	648	734	Not detected	Not detected	Not detected	Not detected	Not detected
Pyrene	691	747	Not detected	Not detected	Not detected	Not detected	Not detected
Benzo(a)anthracene	492	647	Not detected	Not detected	Not detected	Not detected	Not detected
Chrysene	628	734	Not detected	Not detected	Not detected	Not detected	Not detected
bis(2-Ethylhexyl)phthalate	Not detected	108 J	Not detected	Not detected	5.16 J	Not detected	Not detected
Benzo(b)fluoranthene	947	997	Not detected	Not detected	Not detected	Not detected	Not detected
Benzo(k)fluoranthene	355	371	Not detected	Not detected	Not detected	Not detected	Not detected
Benzo(a)pyrene	558	586	Not detected	Not detected	Not detected	Not detected	Not detected
Indeno(1,2,3-cd)pyrene	396	409	Not detected	Not detected	Not detected	Not detected	Not detected
Dibenz(a,h)anthracene	Not detected	149 J	Not detected	Not detected	Not detected	Not detected	Not detected
Benzo(g,h,i)perylene	404	463	Not detected	Not detected	Not detected	Not detected	Not detected
beta-BHC	5.10 P	Not detected	Not analyzed	Not detected	Not analyzed	Not analyzed	Not analyzed
Heptachlor	5.60 P	5.00 P	Not analyzed	Not detected	Not analyzed	Not analyzed	Not analyzed
Aroclor 1260	398	430	Not analyzed	Not detected	Not analyzed	Not analyzed	Not analyzed
2,4-D	30.6 P	23.3 P	Not analyzed	Not detected	Not analyzed	Not analyzed	Not analyzed

TABLE 3 - SOIL SAMPLE INORGANIC RESULTS (mg/kg)

Sample Number	SS001SWMUG-5	SS001SWMUG-105	SG001AOC2-5
Antimony	3.2 U	2.56 U	0.64 U
Arsenic	56.7	80.9	7.09
Barium	56.0	64.4	72.6
Beryllium	0.629	0.66	0.943
Cadmium	0.561	0.386	0.044
Chromium	14.1	12.9	13.4
Cobalt	6.19	5.75	4.21
Copper	38.0	44.1	9.22
Lead	86.1	85.1	2.13
Mercury	0.206	0.142	17.0
Nickel	9.96	13.1	8.75
Selenium	0.50 U	0.348	0.25 U
Silver	0.36 U	0.36 U	0.36 U
Thallium	0.178	0.191	0.06 U
Tin	8.09	8.43	2.73
Vanadium	12.8	12.7	19.3
Zinc	101	113	121
Total cyanide	0.5 U	0.5 U	7.8
Total sulfide	10.0 U	10.0 U	10.0 U

TABLE 4 - WATER SAMPLE INORGANIC RESULTS (ug/L)

Sample Number	RFIMW2 (Total)	RFIMW2 (Dissolved)	RFIMW15 (Total)	RFIMW15 (Dissolved)	RFIMW115 (Total)	RFIMW115 (Dissolved)	RFIMW16 (Total)	RFIMW16 (Dissolved)
Antimony	2.57 U	2.57 U	2.57 U	2.57 U	2.57 U	2.57 U	2.57 U	2.57 U
Arsenic	5.9	4.3	2.60	2.6	1.4	1.4	39.2	29.0
Barium	434	531	145	167	137	176	244	265
Beryllium	1.2 U	2.4 U	1.2 U	2.4 U	1.2 U	2.4 U	1.2 U	0.0574
Cadmium	0.09 U	0.09 U	0.50	0.09 U	0.39	0.67	0.09 U	0.09 U
Chromium	15.4	8.5 U	8.4	8.5 U	7.7 U	8.5 U	44.5	8.5 U
Cobalt	8.7 U	47.7	17.2	85.1	27.7	99.1	8.7 U	25.3
Copper	10.8 U	0.09 U	10.8 U	9.51	10.8 U	20.0	10.8 U	0.9 U
Lead	16.0	1.49 U	31.85	6.45	15.34	7.35	8.74	1.49 U
Mercury	0.045	0.10 U	0.28	0.10 U	0.14	0.10 U	0.20	0.18
Nickel	44.8	5.08	26.9	1.7 U	1.1 U	20.9	51.4	32.5
Selenium	3.39 U	3.39 U	3.39 U	3.39 U	3.39 U	3.39 U	4.0	3.39 U
Silver	0.36 U	0.36 U	0.36 U	0.36 U	10.8	0.36 U	0.36 U	0.36 U
Thallium	3.6	0.74 U	0.74 U	0.74 U	0.74 U	0.74 U	0.74 U	0.74 U
Tin	410	400	622	591	657	599	209	202
Vanadium	10.2	3.0	13	0.62 U	8.72	0.62 U	224	197
Zinc	39.9	10.2	87.2	19.0	59.3	25.3	53.2	11.9
Total cyanide (mg/L)	0.010 U	Not applicable	0.010 U	Not applicable	0.010 U	Not applicable	0.163	Not applicable
Total sulfide (mg/L)	1.00 U	Not applicable	1.00 U	Not applicable	1.00 U	Not applicable	1.00 U	Not applicable

APPENDIX C
ANALYTICAL SUMMARY TABLES



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RZ2-R05020.01.ID.192

February 27, 1998

Mr. Brian Freeman
U.S. Environmental Protection Agency
Region 5 DRE-9J
77 West Jackson Boulevard
Chicago, Illinois 60604

Reference: EPA Contract No. 68-W4-0006; Work Assignment No. R05020; Corrective Action Oversight and Split Sampling; BASF Corporation, Wyandotte, Michigan; U.S. EPA ID No. MID064197742; BASF RFI Data Validation Report Assessment and RFI Report Hydrogeological Data Evaluation; Tasks 06 and 09 Deliverable

Dear Mr. Freeman:

Please find enclosed TechLaw's review of the data validation reports provided in Appendix D of the BASF Corporation's (BASF's) RCRA Facility Investigation (RFI) report for the above referenced facility. Also included in this deliverable is a comparison of analytical results for split samples obtained by TechLaw during the field portion of BASF's RFI investigation in . This deliverable has been prepared in response to your December 9, 1997 Technical Directive Memorandum (TDM).

Also requested in the TDM was a review of the hydrogeological characterization presented in the RFI Report. As discussed with Ms. Diane Sharrow, the Region 5 Technical Contact for this TDM, additional information is required to complete a full assessment of the hydrogeological characterization. As agreed to by Ms. Sharrow, this information has been requested from the facility and their contractor, QST. This information was requested two weeks ago, however to this date, it has still not been provided to the TechLaw Team for review. Upon receipt of this information, or upon direction from you or Ms. Sharrow, we will complete the review of the hydrogeological characterization and submit it under separate cover.

As you are aware, Intertek Testing Services (ITS) of Richardson, Texas, a TechLaw Team subcontractor laboratory, recently notified U.S. EPA of irregularities in its data reporting for volatile organic compound (VOC) analyses by SW-846 methods 8240 or 8260. The VOC analyses reported in the attached deliverable are included in the potentially affected data. Based on the most recent information received from ITS, all such data packages will be regenerated at



Mr. Brian Freeman

February 27, 1998

Page 2

the laboratory's expense. In those cases where data have already been regenerated for other sites, the data have not changed after review in many cases, and in those cases where changes have been warranted, they are of a relatively minor magnitude (two to five percent changes in reported concentrations). In addition, all samples obtained at the BASF facility under this assignment by TechLaw were split samples and, therefore, meant to confirm the facility's laboratory's performance. As is discussed in the comparison of split sample results provided in this deliverable, the results obtained by TechLaw and BASF are generally comparable and provide no indication of poor performance by either TechLaw or BASF's laboratories. Please note, upon receipt of the revised VOC data package from ITS, a detailed comparison to both the data originally reported by ITS and that reported by BASF's laboratory will be performed and a report summarizing any findings provided to U.S. EPA Region 5. However, it is important to note that, per instructions received from Ms. Sharrow following the actual split sampling event in 1996, the data obtained by TechLaw has not been validated. We will retain complete copies of both the original and any resubmitted data packages should validation be requested in the future.

As requested in the above referenced TDM, TechLaw reviewed the data validation reports included in Appendix D of the RFI Report. The purpose of this review was to determine the adequacy of the data validation performed by the facility's independent validation contractor, Environmental Standards, Inc., in terms of completeness, accuracy and appropriateness of qualifications. It appears that the validation was consistent with the requirements of the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* and the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. The validation effort appeared to be comprehensive and appropriately conservative, and included comments and observations that indicated that the data was thoroughly evaluated. Several minor transcription errors, and inconsistencies, as well as a limited number of technical errors were noted. However, in the vast majority of cases, it does not appear that correction of the technical errors will result in the rejection any data currently deemed usable, since only "J" flags are affected in all cases except two (see Specific Comments 8 and 20). These issues are summarized in the attached comments.

Please feel free to contact myself at (312) 345-8963 or Mr. John Koehnen at (312) 345-8938 if you have any questions.

Sincerely,



Patricia Brown-Derocher
Regional Manager

cc: F. Norling, US EPA Region 5 (w/out attachment)
D. Sharrow, USEPA Region 5

Chicago Central Files
B. Jordan/Central Files

**BASF CORPORATION.
US EPA ID No. MID064197742**

**RFI DATA VALIDATION REPORT REVIEW
AND HYDROGEOLOGICAL ASSESSMENT**

TASKS 06 and 09 DELIVERABLE

Submitted to:

**Mr. Brian Freeman
U.S. EPA Environmental Protection Agency
Region 5 DRE-9J
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**EPA Work Assignment No.
Contract Number
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68-W4-0006
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February 27, 1998

**BASF CORPORATION
WYANDOTTE, MICHIGAN
US EPA ID No. MID064197742**

RFI DATA VALIDATION REPORT REVIEW

GENERAL COMMENTS

1. In several of the Data Validation Reports, sample results qualified as non-detected and flagged "U" were not further qualified as estimates and flagged "J" for QC deficiencies which required the qualification of non-detects. Examples include, but are not limited to, the following.
 - In Data Validation Report 5, *bis*(2-ethylhexyl)phthalate was qualified "U" due to blank contamination in samples SG005SWMUFSP07, SG010SWMUFSP06 and SG011SWMUFSP18. However, it appears that the results should have been qualified "UJ" to also account for low internal standard areas.
 - In Data Validation Report 7, antimony in sample SG002AOC6SP55 should be qualified "J" due to matrix spike recoveries, in addition to the "U" qualifier applied as a result of blank contamination.
 - In Data Validation Report 9, the antimony results for all samples should be qualified "J" due to matrix recoveries, in addition to the "U" qualifier applied due to blank contamination.
 - In Data Validation Report 10, methylene chloride should be qualified "J" in samples SG008AOC23 and SG001SWMUG8 due to low surrogate recoveries, in addition to the "U" qualifier applied as a result of blank contamination.

Revise the validation reports and all associated sections and tables of the RFI Report to reflect all changes in the qualifiers assigned in addressing this issue. Alternatively, provide the rationale for not assigning those qualifiers associated with non-detects to results flagged "U" due to blank contamination.

2. It appears that the data reviewers were not consistent in the reporting of sample results on the Analytical Results tables for those results greater than the laboratory reporting limits and qualified as non-detects (flagged "U") due to blank contamination. According to the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (Functional Guidelines)*, the reporting limit should be replaced by the detected concentration and qualified "U". For example, if a compound with a reported result of 10 ug/kg and a reporting limit of 5 ug/kg were qualified "U" due to blank contamination, the

validated results should be 10 U, not 5 U. Revise the data validation as necessary to address this issue, ensuring that all affected validation reports, analytical summaries and Data Qualifier discussions are appropriately revised. If professional judgment was used to take an action other than that specified in the *Functional Guidelines*, provide a thorough rationale for this decision.

3. In those cases where samples were reanalyzed for organic parameters, the validation reports provide no indication of which set of results are of better quality and should, therefore, be used. In addition, in many cases the reanalyses were not clearly identified in the Analytical Results tables. Examples include, but are far from limited to:
 - In Data Validation Report 1, the results for sample SG001RFIMW24 and its reanalysis were validated and reported. It appears that the reanalysis may be the better of the two analytical runs, since all non-detects in the original acid fraction were rejected, but all results were qualified only as estimates (due to exceeded holding time) in the reanalysis.
 - In Data Validation Report 2, the results for sample SG013RFIMW07 and its reanalysis are reported. However, no reason is given for the reanalysis and, therefore, no determination as to which sample results to be used can be made.
 - In Data Validation Report 5, the results for sample SG006SWMUFP11 and its reanalysis are reported. However, both samples exhibited the same QC criteria out of control, most likely indicating that the original analysis should be reported and used for decision-making purposes.

In each case where a sample was reanalyzed, revise all appropriate sections and/or appendices of the RFI Report to clearly indicate which analysis appears to be of better quality, based on the validation criteria, and to clearly indicate which set of results is reported and to be used for decision-making purposes.

4. Filtered and unfiltered inorganic results and field duplicate results were qualified based on poor agreement between the two sets of results for a given sampling location. Since validation based on the agreement between filtered and unfiltered results or field duplicate results are not addressed in the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, it appears that professional judgment was used to apply the qualifiers. Furthermore, it may be that either an unnecessarily conservative criterion was used, or errors exist in the application of qualifiers due to this issue. See for example the barium results for sample MW000RFIMW3 in Data Validation Report 25. Provide the rationale and criteria used to make all such judgments.

SPECIFIC COMMENTS

1. Report 1 (SDG A6G1701300) - The Analytical Results tables for the inorganic analyses could not be located in Section 2, Analytical Results. Based on the text, it appears that validation was appropriately performed, however, no verification of the assignment of qualifiers could be made. Provide the missing tables.
2. Report 2 (SDG A6G250145) - According to Item 11 of the Organic Data Qualifiers in Section 1, the volatile organic compounds (VOCs) quantitated using the internal standard chlorobenzene-d5 were qualified in sample SG004RFIMW07. However, the qualifiers were not included on the Analytical Results table on page 1 and 2 of Section 2. Revise the Data Validation Report to address this discrepancy.
3. Report 4 (SDG A6310114) - Item 1 of the Organic Data Qualifiers in Section 1 incorrectly indicates that pentachlorobenzene has been rejected. As accurately reflected in the Analytical Results table in Section 2, the compound for which the result was rejected is actually pentachloronitrobenzene. Revise the Data Validation Report to address this discrepancy.
4. Report 5 (SDG A6H020118) - For sample SG010SWMUFSP06, the compound chloroethane, rather than chlorodibromomethane, should have the "UJ" qualifier on page 10 of the Volatile Analytical Results table in Section 2. Revise the Data Validation Report to address this transcription error.
5. Report 5 (SDG A6H020118) - For sample SG006SWMUFSP11, the compound pentachloronitrobenzene, rather than pentachlorophenol, should have the "UR" qualifier on page 19 of the Semivolatile Analytical Results table in Section 2. Revise the Data Validation Report to address this transcription error.
6. Report 6 (SDG A6H030119) - The pH results are not included in the Analytical Results tables in Section 2. Revise the tables to include the pH results.
7. Report 7 (SDG A6H150150) - Sample RS000AOC6 was incorrectly identified as AS000AOC6 in Item 2 of the Organic Data Qualifiers section. Correct this typographical error.
8. Report 8 (SDG A6H160167) - The Data Validation Report does not address the low recoveries for surrogate TCX and the zero percent recoveries for DCB reported on Form 2 for sample SD004SWMUE4 in the pesticide/PCB results. It appears that all non-detected results for this sample should be rejected. Either provide a thorough rationale for not rejecting the results, or revise as necessary all affected sections of the Data Validation Report and the text of the RFI Report to address the rejection of these results.

9. Report 8 (SDG A6H160167) - Item 2 of the Organic Data Qualifiers section identifies an incorrect sample number. The actual sample qualified appears to be SD003SWMUE1, rather than SD004SWMUE4, as reflected in the Analytical Results tables. Revise the Data Validation Report to address this discrepancy.
10. Report 8 (SDG A6H160167) - According to the Volatiles Analytical Results tables, 2-butanone (MEK) was qualified as "UJ" in samples SD003SWMUE2 and SD004SWMUE4. However, the Organic Data Qualifiers section does not address this compound. Revise the Data Validation Report to address this inconsistency.
11. Report 9 (SDG A6H160149) - 1,2-Dichloroethane was rejected and flagged "R" in samples SG002AOC6SP63 and SG002AOC6SP64 according to the Volatile Analytical Results tables. However, the Organic Data Qualifiers section provides no reason for these qualifiers. Revise the Data Validation Report to address this issue.
12. Report 10 (SDG A6H220161) - Several VOCs were apparently incorrectly qualified for low internal standard areas based on a review of relative retention times found on page 378 of the associated data package. Tetrachloroethene, toluene and 4-methyl-2-pentanone should also be qualified "UJ" for those samples qualified due to low chlorobenzene-d5 areas. In addition, EDB and chlorodibromomethane are not associated with chlorobenzene-d5, but with internal standard 1,4-difluorobenzene and should not, therefore, be qualified in those samples with chlorobenzene-d5 as the only internal standard with areas outside the QC limits. Revise the Data Validation Report to address this issue.
13. Report 10 (SDG A6H220161) - The compound phenacetin was qualified "UJ" in the Semivolatile Analytical Results tables for sample SS001SWMUG4. However, the Organic Data Qualifiers section does not address this qualifier. Revise the Data Validation Report to correct this discrepancy.
14. Report 10 (SDG A6H220161) - It is indicated under the Noncorrectable Deficiency, Item 4, listed on page 4 of Section 1, that the impact of the deficiency is discussed in the Organic Qualifier Section. However, said discussion could not be found, nor were qualifiers applied to the associated compound, methoxychlor. Revise the Data Validation Report to provide this information and any associated qualifiers.
15. Report 11 (SDG A6H240102) - It is indicated in the Inorganic Data Qualifiers section that the zinc result for sample SG001AOC26 should be qualified "J". Revise the Analytical Results table to include this qualifier.
16. Report 12 (SDG A6H240106) - It appears that the zinc result for sample RS00AOC7, an aqueous sample, was incorrectly qualified based on the results of the soil ICP serial dilution. Revise the Data Validation Report as necessary to address this issue.

17. Report 13 (SDG A6H270124) - All results for sample RS000AOC2 were qualified "UJ/J" because the sample was analyzed one day beyond the seven-day holding time. According to the *Functional Guidelines*, only aromatic compounds should be qualified in unpreserved aqueous samples when the seven-day holding time is exceeded. All other compounds have a 14-day holding time. (The Data Validation Report does not clearly indicate that the sample was unpreserved; it is only so inferred based on the application of the qualifiers). Revise the Data Validation Report as necessary to address this apparent unnecessarily conservative application of qualifiers.
18. Report 15 (SDG A6I100127) - It is indicated in the Organic Data Qualifiers section that the 1,3,5-trinitrobenzene result for sample SW000AOC7 should be qualified "UR". Revise the Semivolatile Analytical Results table to include this qualifier
19. Report 24 (SDG A6I250139) - According to Item 4 of the Organic Data Qualifiers section, the 4-nitrophenol results should be qualified in two of the four reported samples. However, the results for this compound are qualified in all four samples on the Semivolatile Analytical Results tables. Revise either the text or table as necessary to address this discrepancy.
20. Report 30 (SDG A6J010134) - The second item of the Noncorrectable Deficiencies section indicates that the holding times were exceeded by 20 days for samples MW000RFIMW-29, MW000RFIMW30 and TB-10/1/96. For these samples, the holding times have been grossly exceeded and all VOC non-detect results should be rejected and flagged "R". Either revise all associated sections and tables of the Data Validation Report and main RFI Report to address these rejections, or provide a thorough rationale for deviating from the *Functional Guidelines*.
21. Report 30 (SDG A6J010134) - The second item in the Inorganic and Wet Chemistry Data Qualifiers section indicates that the cyanide samples were of a soil matrix. However, the Analyte Results Summary and supporting documents indicate a water matrix. Revise the Data Validation Report to address this discrepancy.
22. Report 32 (SDG A6K200114) - All VOC results, except those previously flagged "UR", were qualified as estimated due to exceeded holding times. However, it is indicated in Item 5 of the Organic Data Qualifiers section that only the aromatic compounds were qualified. Revise the Data Validation Report to resolve this discrepancy.
23. Report 33 (SDG A6L190128) - The analytical results table for the VOC analysis of sample MW000RFIMW9 was not included in Section 2, Analytical Results. While the reported validation appears to be accurate, the application of qualifiers could not be confirmed. Revise the Data Validation Report to include this table.

24. Report 33 (SDG A6L190128) - Several results were rejected and flagged "R" due to very low Laboratory Control Sample (LCS) recoveries. However, validation due to LCS results are typically based on project-specific criteria. No such criteria are presented. Revise the Data Validation Report to discuss the criteria used to qualify results based on LCS recoveries.
25. Report 34 (SDG A7C190143) - Several semivolatile results were rejected and flagged "R" due to very low Laboratory Control Sample (LCS) recoveries. However, validation due to LCS results are typically based on project-specific criteria. No such criteria are presented. Revise the Data Validation Report to discuss the criteria used to qualify results based on LCS recoveries.
26. Report 35 (SDG A7F030144) - It appears that Item 7 in the Inorganic Data Qualifier section incorrectly identified the qualifier due to RPD criteria as "U*". The qualifier should be "UJ" unless previously qualified due to blank contamination. Revise the Data Validation Report to address this apparent discrepancy.

**BASF CORPORATION
WYANDOTTE, MICHIGAN
US EPA ID No. MID064197742**

**RFI DATA - COMPARISON OF ANALYTICAL RESULTS
BASF RFI DATA AND TECHLAW SPLIT SAMPLES**

The TechLaw Team compiled analytical results from BASF's RFI Report and TechLaw's split sampling activity to compare the concentrations of detected constituents. In summary, analytical results obtained by BASF's laboratory (Quanterra) and TechLaw's laboratory (Intertek Testing Services) appear to be generally comparable.

The split sample results are shown in Table 1 (Comparison of Groundwater Sample Results) and Table 2 (Comparison of Soil Sample Results). As can be seen upon review of these tables, the laboratories generally identified the same compounds as present in the samples. When the same constituents were detected, the relative percent difference (RPD) results ranged from a low of 1% to a high of 153%. In most cases, the RPD was below 50%, a standard criterion for comparing a sample and its duplicate. While the results presented in Tables 1 and 2 do show moderate to high variability between the laboratories for certain constituents, the range of results appears to be within acceptable limits for a split sampling event, considering that the samples were analyzed by different laboratories using different instruments and Standard Operating Procedures (SOPs). In addition, the types of compounds detected by each laboratory are similar (primarily polynuclear aromatic hydrocarbons) and all variations in split sample results are by less than an order of magnitude.

Several organic compounds were reported by one laboratory but not the other. In many cases the detected concentration was close to or below the detection limit for the other laboratory. See for example the phenol results reported for sample MW000RFIMW2. In addition, the vast majority of the remaining compounds detected by one laboratory but not the other are common laboratory contaminants, such as methylene chloride and phthalate compounds. Since the data collected by TechLaw has not, per direction from U.S. EPA, been validated, it is likely that many of these positive results would be changed to non-detects upon validation, removing many of the apparent anomalies. All organic compounds for which positive results were reported by either laboratory are included in Tables 1 and 2.

Not all inorganic constituents are included in Table 2. Metals concentrations vary considerably depending upon sample location, media and the aliquot chosen for analysis. Therefore, only those inorganic constituents detected at concentrations above the BASF Project Specific Action

Levels (PSALs), as noted in the BASF RFI Report, are included for comparison. Additional inorganic constituents were detected in the groundwater and soil samples but have not been included here.

Two field duplicate samples were obtained by TechLaw during the split sampling activities. The water samples RFIMW15 and RFIMW115 are included in Table 1 and soil samples SS001SWMUG-5 and SS001SWMUG-105 in Table 2. As with the split samples, the agreement between the field duplicates was generally acceptable, with limited instances of higher degrees of variation in the soil samples.

TABLE 1 - COMPARISON OF GROUNDWATER SAMPLE RESULTS

ANALYTES	BASF RESULT (ug/L)	TECHLAW RESULT (ug/L)	RPD
MW000RFIMW2			
Acetone	27	10.0 U	NC
Carbon Disulfide	0.59	1.0 U	NC
<i>bis</i> (2-Chloroethyl)ether	45	47.4	5.4%
1,4 Dioxane	4	500 U	NC
4-Methylphenol	95	88.9	6.6%
3-Methylphenol	95	Not reported	NC
Phenol	5.3	10.0 U	NC
RFIMW15¹			
<i>bis</i> (2-Ethylhexyl)phthalate	5 U	5.16 J / 10 U	NC / NC
<i>bis</i> (2-Ethylhexyl)phthalate (Reanalysis)	5 U	10 U / 10 U	NC / NC
MW000RFIMW16			
Acetone	540	328	49%
Benzoic Acid	Not reported	29.0 J	NC
Carbon Disulfide	3.4	2.9	16%
1,4, Dioxane	39	500 U	NC
Methyl Ethyl Ketone	43	10.0 U	NC
4- Methylphenol	200 U	11.6	NC
Phenol	350	228	42%
Toluene	2	1.0 U	NC

U = Not Detected at shown Quantitation Limit

NC = Not Calculated

¹ The semivolatile analysis was rerun to improve identification of numerous Tentatively Identified Compounds (TICs) detected during the original analysis. The TICs are not addressed here, but are further identified in Form 1 SV-TIC data sheet number 223 in the original data package. Results and RPD are for a primary environmental sample (RFIMW15) and a duplicate environmental sample (RFIMW115) respectively.

TABLE 2 - COMPARISON OF SOIL SAMPLE RESULTS

ANALYTES	BASF RESULT (ug/kg)	TECHLAW RESULT (ug/kg) ¹	RPD ¹
SS001SWMUG-5			
Acenaphthylene	150 J	330 U / 120 J	NC / 22%
Anthracene	90 J	330 U / 81.4 J	NC / 10%
Benzo(a)anthracene	440	492 / 647	11% / 38%
Benzo(b)fluoranthene	790	947 / 997	18% / 23%
Benzo(k)fluoranthene	220 J	355 / 371	47% / 51%
Benzo(g,h,i)perylene	220 J	404 / 463	59% / 71%
Benzo(a)pyrene	420	558 / 586	28% / 33%
Chrysene	440	628 / 734	35% / 50%
Dibenzofuran	210 J	272 J / 330 U	26% / NC
Fluoranthene	510	648 / 734	24% / 36%
Indeno(1,2,3-cd)pyrene	200 J	396 / 409	66% / 69%
2-Methylnaphthalene	600	995 / 667	50% / 11%
Naphthalene	360 J	656 / 425	58% / 17%
Phenanthrene	540	770 / 622	35% / 14%
Pyrene	540	691 / 747	25% / 32%
Arochlor 1260	370 J	398 / 430	7% / 15%
Pentachlorophenol	39	1,650 U / 1,650 U	NC / NC
Arsenic	65.6 (12)	56.7 / 80.9	15% / 21%
Lead	121 (63.3)	86.1 / 85.1	34% / 35%
Methylene Chloride	6 U	12.0 / 8.6	NC / NC
Di-n-butylphthalate	370 U	330 U / 43.4 J	NC / NC
bis(2-ethylhexyl)phthalate	370 U	330 U / 108 J	NC / NC
Dibenz(a,h)anthracene	370 U	330 U / 149 J	NC / NC
beta-BHC	9.4 U	5.10 J / 1.50 U	NC / NC
Heptachlor	9.4 U	5.60 J / 5.00 J	NC / NC
2,4-D	110 U	30.6 J / 23.3 J	NC / NC

TABLE 2 - COMPARISON OF SOIL SAMPLE RESULTS

ANALYTES	BASF RESULT (ug/kg)	TECHLAW RESULT (ug/kg) ¹	RPD ¹
SG002AOC2-5			
Methylene Chloride	10 U	11.0	NC / NC
Chromium	101 (23.9)	13.4	153%
Mercury	17.1 (0.8)	17.0	1%
Total Cyanide	21 (0.1)	7.8	92%

U = Not Detected at shown Quantiation Limit

NC = Not Calculated

¹ Results and RPD are for a primary environmental sample (SS001SWMUG-5) and a duplicate environmental sample (SS001SWMUG-105) respectively

From: Arthur Ostaszewski <OSTASZEA@state.mi.us>
Date: R5WST.R5RCRA(SHARROW-DIANE)
Subject: 3/2/98 1:20pm
BASF North Works, Wyandotte -Reply

I looked at the fax, thanks. There are bigger fish to fry than Northworks right now. Our Trenton Sediments Report is on the way. We are working on a database of Detroit River Outfall observations 1960-1969, and Wyandotte Chemical-Northworks has come up numerous times for having milky and black discharges.

Take Care,

Art

Art Ostaszewski
SWQD-GLEAS

From: Arthur Ostaszewski <OSTASZEA@state.mi.us>
To: R5WST.R5RCRA(SHARROW-DIANE)
Date: 2/10/98 8:18am
Subject: Draft BASF- Northworks Phase I RFI Report -Reply -Reply
-Reply-Reply-Reply -Reply

Please send the "critical pages", Im interested.
fax # 517-373-9958

I agree the AOC's sediments need corrective action. It took
\$116 Million in NY to do the volume we have in the Trenton.
Its such a large task, getting it up and started has been very
difficult.

Art
Art Ostaszewski-SWQD/GLEAS

① BASF
call Art
Ostaszewski
or
e-mail